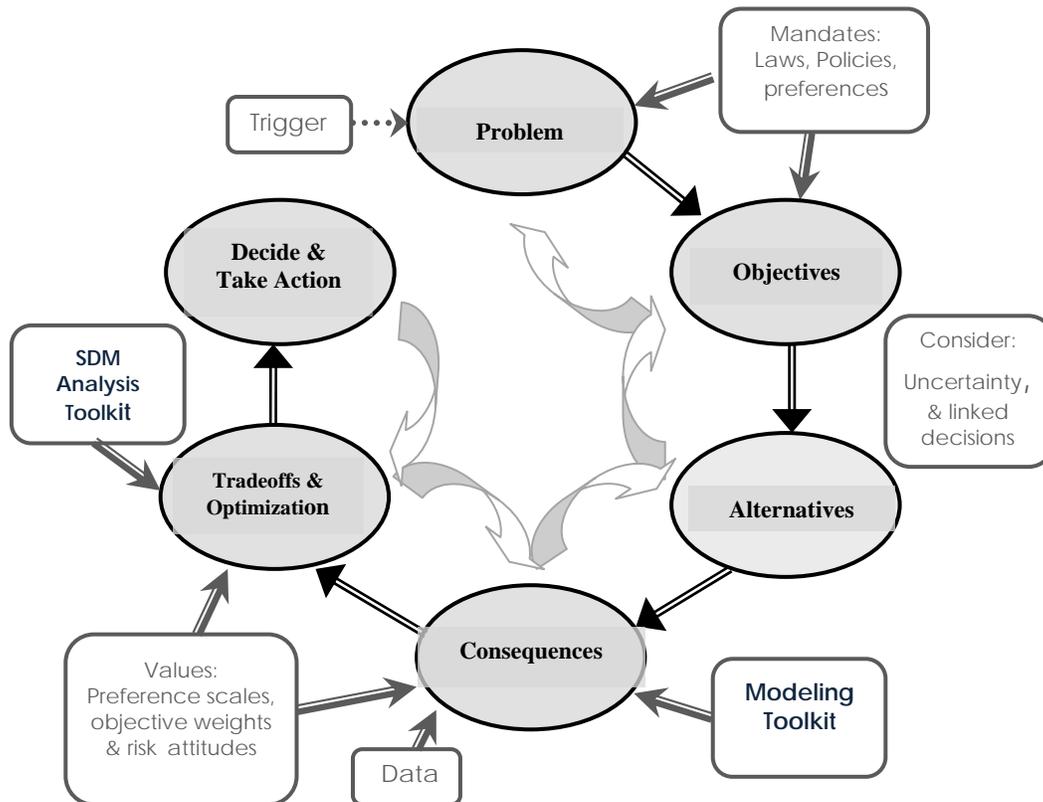


Structured Decision Making Fact Sheet

What is structured decision making? Structured decision making is a general term for carefully organized analysis of problems in order to reach decisions that are focused clearly on achieving fundamental objectives. Based in decision theory and risk analysis, SDM encompasses a simple set of concepts and helpful steps, rather than a rigidly-prescribed approach for problem solving. Key SDM concepts include making decisions based on clearly articulated fundamental objectives, dealing explicitly with uncertainty, and responding transparently to legal mandates and public preferences or values in decision making; thus, SDM integrates science and policy explicitly. Every decision consists of several primary elements – management objectives, decision options, and predictions of decision outcomes. By analyzing each component separately and thoughtfully within a comprehensive decision framework, it is possible to improve the quality of decision-making. The core SDM concepts and steps to better decision making are useful across all types of decisions: from individuals making minor or personal decisions to complex public sector decisions involving multiple decision makers, scientists and other stakeholders. In turn, an array of simple to highly quantitative analytical methods is available for structured decision analysis.

Structured Decision Making Steps:



Steps of Structured Decision Making:

- *Problem definition.* What specific decision has to be made? What are the spatial and temporal scope of the decision? Will the decision be iterated over time?
- *Objectives.* What are the management objectives? Ideally, these are stated in quantitative terms that relate to metrics that can be measured. Setting objectives falls in the realm of policy, and should be informed by legal and regulatory mandates, as well as stakeholder viewpoints. A number of methods for stakeholder elicitation and conflict resolution are appropriate for clarifying objectives.
- *Alternatives.* What are the different management actions to choose from? This element requires explicit articulation of the alternatives available to the decision maker. The range of permissible options is often constrained by legal or political considerations, but structured assessment may lead to creative new alternatives.
- *Consequences.* What are the consequences of different management actions? How much of the objectives would each alternative achieve? In structured decision-making, we predict the consequences of the alternative actions with some type of model. Depending on the information available or the quantification desired for a structured decision process consequences may be modeled with highly scientific computer applications or with personal judgment elicited carefully and transparently. Ideally, models are quantitative, but they need not be; the important thing is that they link actions to consequences.
- *Tradeoffs.* If there are multiple objectives, how do they trade off with each other? In most complex decisions, the best we can do is choose intelligently between less-than-perfect alternatives. Numerous tools are available to help determine the relative importance or weights among conflicting objectives and to then compare alternatives across multiple attributes to find the ‘best’ compromise solutions.
- *Uncertainty.* Because we rarely know precisely how management actions will affect natural systems, decisions are frequently made in the face of uncertainty. Uncertainty makes choosing among alternative far more difficult. A good decision-making process will confront uncertainty explicitly, and evaluate the likelihood of different outcomes and their possible consequences.
- *Risk Tolerance.* Identifying the uncertainty that impedes decision-making, then analyzing the risk that uncertainty presents to management is an important step in making a good decision. Understanding the level of risk a decision-maker is willing to accept, or the risk response determined by law or policy, will make the decision-making process more objectives-driven, transparent, and defensible.
- *Linked decisions.* Many important decisions are linked over time. The key to dealing effectively with linked decisions is to isolate and resolve the near-term issues while sequencing the collection of information needed for future decisions.

Adaptive Resource Management (ARM). For those decisions that are iterated over time, actions taken early on may result in learning that improves management later, provided that an appropriate monitoring program is in place to provide the feedback. Adaptive management, then, is a special case of structured decision making for decisions that are iterated or linked over time.

Strategic Habitat Conservation (SHC). Strategic habitat conservation is a science-based approach to conservation focused on providing landscapes capable of sustaining trust species populations at objective levels. The approach is founded on an adaptive, iterative process of biological planning, conservation design, conservation delivery, monitoring, and research which includes structured decision making as a key step in its design.

Structured decision making in the USFWS. Structured decision-making has been applied in all branches of the Service to various degrees over the past twenty years. Endangered species applications have included structured assessment of extinction risks for listing decisions, as well as analysis of prioritizing recovery actions. The National Wildlife Refuges have been working with USGS through the Refuge Cooperative Research Program to develop application of structured decision making and adaptive management on refuges; in addition, the Comprehensive Conservation Planning (CCP) and Habitat Management Planning (HMP) processes are designed as structured decision processes. In the Migratory Bird Program, structured decision making is deeply embedded in many of the regulatory decisions, especially for waterfowl harvest.

Capacity in USFWS and USGS to deliver structured decision making. Agencies within DOI have been exemplary in developing application of structured decision making, but the capacity to deliver this approach for a large number of applications is quite limited. Both agencies are currently discussing how to increase our collective ability to use this approach. The National Conservation Training Center has been working with scientists from USGS's Patuxent Wildlife Research Center to develop a curriculum for building the capacity of both agencies in structured decision making that includes instructor led courses and "hands-on" experiential workshops that address real FWS decision problems. Recent examples of decision problems at these USFWS/USGS Structured Decision Making workshops include:

- Regional and Field Perspectives on Factors that Affect Decision Making with Respect to American Shad
- Habitat Management for Multiple Wetland Bird Objectives on National Wildlife Refuges
- Conservation and Management Decisions for Mountain Plovers throughout the Annual Cycle
- Northeast Regional Science Committee Research Funding
- Application of Structured Decision Making to Assess Multiple Scale Monitoring Needs for Waterbird Management
- Missouri River Emergent Sandbar Habitat Creation
- Endangered Species of the Edwards Aquifer, Texas
- Steller's Eider Reintroduction
- Maximizing Bull Trout Conservation through Workload Allocation
- Atlantic Salmon Recovery
- Multi-Species Management of the Horseshoe Crab and Shorebird Populations in Delaware Bay

What is the structured decision making Community of Practice? A community of practice is a group of people who share a concern, set of problems, or passion about a topic, and who deepen their knowledge and expertise in this area by interacting with each other on an ongoing basis. A small structured decision making community of practice has formed among agency and academic scientists, managers, and practitioners to promote training, exchange of knowledge, and the collaborative application of structured processes to natural resource conservation decisions.

What training is available? Several new courses are available through NCTC that provide training in support of structured decision making.

- Introduction to Structured Decision Making – CSP3171: *October 27-31, 2008; March 2-6, 2009; August 24-28, 2009*
- Adaptive Management: Structured Decision Making for Recurrent Decisions – CSP3176: *September 15-19, 2008; June 22-26, 2009*
- USFWS/USGS Structured Decision Making Workshop – ECS3159: *December 8-12, 2008; May 11-15, 2009; August 10-14, 2009*
- Principles of Modeling for Conservation Planning and Analysis – ECS3149: *October 6-10, 2008; February 2-6, 2009; May 18-22, 2009*